

## CLAIMS

- 1 1. A fuel for a direct methanol fuel cell comprising:  
2 methanol, and  
3 an effective amount of an additive that undergoes a reaction with water to produce  
4 small molecules that are easily electro oxidized.
- 1 2. A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is  
2 dimethyloxymethane.
- 1 3. A fuel for a direct methanol fuel cell as in claim 2, wherein the fuel comprises  
2 about 20 mole percent dimethyloxymethane.
- 1 4. A fuel for a direct methanol fuel cell as in claim 3 further comprising less than  
2 about .1% by weight of an indicating dye.
- 1 5. A fuel for a direct methanol fuel cell as in claim 4 where the indicating dye in-  
2 cludes sulfonated activated carbon particles.
- 1 6. A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is  
2 methylorthoformate.
- 1 7. A fuel for a direct methanol fuel cell as in claim 6, wherein the fuel comprises  
2 about 10 mole percent methylorthoformate.
- 1 8. A fuel for a direct methanol fuel cell as in claim 7 further comprising less than  
2 about .1% by weight of an indicating dye.
- 1 9. A fuel for a direct methanol fuel cell as in claim 8 where the indicating dye in-  
2 cludes sulfonated activated carbon particles.

- 1 10. A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is  
2 tetramethylorthocarbonate.
- 1 11. A fuel for a direct methanol fuel cell as in claim 10, wherein the fuel comprises  
2 about 10 mole percent tetramethylorthocarbonate.
- 1 12. A fuel for a direct methanol fuel cell as in claim 11 further comprising less than  
2 about .1% by weight of an indicating dye.
- 1 13. A fuel for a direct methanol fuel cell as in claim 12 where the indicating dye in-  
2 cludes sulfonated activated carbon particles.
- 1 14. A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is tri-  
2 methylborate.
- 1 15. A fuel for a direct methanol fuel cell as in claim 14, wherein the fuel comprises  
2 about 7 mole percent trimethylborate.
- 1 16. A fuel for a direct methanol fuel cell as in claim 15 further comprising less than  
2 about .1% by weight of an indicating dye.
- 1 17. A fuel for a direct methanol fuel cell as in claim 16 where the indicating dye in-  
2 cludes sulfonated activated carbon particles.
- 1 18. A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is tet-  
2 ramethylorthosilicate.
- 1 19. A fuel for a direct methanol fuel cell as in claim 18, wherein the fuel comprises  
2 about 5 mole percent tetramethylorthosilicate.

1 20. A fuel for a direct methanol fuel cell as in claim 19 further comprising less than  
2 about .1% by weight of an indicating dye.

1 21. A fuel for a direct methanol fuel cell as in claim 20 where the indicating dye in-  
2 cludes sulfonated activated carbon particles.

1 22. A fuel for a direct methanol fuel cell comprising:  
2 methanol; and  
3 at least one additive that undergoes a reaction with water to produce small mole-  
4 cules that are easily electro oxidized selected from the group consisting of: di-  
5 methyloxymethane, methylorthoformate, tetramethyl orthocarbonate, trimethyl  
6 borate, and tetramethyl orthosilicate.

1 23. A fuel for a direct methanol fuel cell as in claim 22 further comprising less than  
2 about .1% by weight of an indicating dye.

1 24. A fuel for a direct methanol fuel cell as in claim 23 where the indicating dye in-  
2 cludes sulfonated activated carbon particles.

1 25. A fuel additive for a direct methanol fuel cell consisting essentially of at least one  
2 additive that undergoes a rapid reaction with water to produce small molecules that are  
3 easily electro oxidized selected from the group consisting of: dimethyloxymethane,  
4 methylorthoformate, tetramethyl orthocarbonate, trimethyl borate, and tetramethyl ortho-  
5 silicate; and an effective amount of an indicating dye.

1 26. A fuel for a direct methanol fuel cell comprising:  
2 methanol, and  
3 an effective amount of a metal hydride.

1 27. A fuel for a direct methanol fuel cell comprising:  
2 methanol;

3           an effective amount of an additive that undergoes a reaction with water to produce  
4   small molecules that are easily electro oxidized; and  
5   an effective amount of a metal hydride.

1   28.   A fuel for a direct methanol fuel cell comprising:  
2           methanol; and

3           an effective amount of at least one additive that undergoes a reaction with water  
4   to produce small molecules that are easily electro oxidized selected from the group con-  
5   sisting of: dimethyloxymethane, methylorthoformate, tetramethyl orthocarbonate, tri-  
6   methyl borate, and tetramethyl orthosilicate; and  
7   an effective amount of a metal hydride.

1   29.   A method for enabling the detection of fuel leaking from a fuel cell comprising  
2   the step of adding a dye to the fuel.

1   30.   A method for enabling detection of fuel leaking from the fuel cell according to  
2   claim 29 where the dye comprises sulfonated activated carbon particles.

1   31.   The method of preparing a fuel mixture for a direct methanol fuel cell comprising  
2   the steps of:

3           a)    providing a supply of concentrated methanol; and  
4           b)    adding an effective amount of a at least one additive that undergoes a re-  
5                action with water to produce small molecules that are easily electro oxi-  
6                dized selected from the group consisting of: dimethyloxymethane, meth-  
7                ylorthoformate, tetramethyl orthocarbonate, trimethyl borate, and tet-  
8                ramethyl orthosilicate.

1   32.   The method of preparing a fuel mixture for a direct methanol fuel cell as in claim  
2   30 further comprising the step of :

3           c)    providing a supply of concentrated methanol; and

- 4 adding an effective amount of at least one metal hydride selected from the group con-  
5 sisting of  $\text{LiAlH}_4$ ,  $\text{NaBH}_4$ ,  $\text{LiBH}_4$ ,  $(\text{CH}_3)_2\text{NHBH}_3$ ,  $\text{NaAlH}_4$ ,  $\text{B}_2\text{H}_6$ ,  $\text{NaCNBH}_3$ ,  $\text{CaH}_2$ ,  
6  $\text{LiH}$ ,  $\text{NaH}$ ,  $\text{KH}$  and sodium bis (2-methoxyethoxy) dihydridaluminate.